Some Apparently New Thysanoptera from Michigan.

By A. Franklin Shull.

The species herein described were taken in Huron County, Michigan, in the summer of 1908, while I was engaged as Entomologist on the Michigan Biological Survey. As it will be some time before the complete Report of the Survey of 1908 is ready for publication, the descriptions of new species are published here with the permission of the Chief Field Naturalist, Dr. A. G. Ruthven. In the preparation of this paper I have become indebted to Dr. W. E. Hinds for assistance in determining some of the older species; to Mr. J. Douglas Hood for the loan of several of his types and for comparing another of my specimens with his own; to Mr. Dudley Moulton for a similar kindness; and to the authorities of the U. S. National Museum for the privilege of examining their collection.

The entire collection is to be deposited in the Museum of the University of Michigan.

Suborder Terebrantia Haliday.

Family THRIPIDAE Uzel.

Genus **HETEROTHRIPS** Hood (1908).

Heterothrips salicis n. sp. (Fig. 1).

Female.—General color of body dark brown, appearing nearly black to the unaided eye by reflected light. Length of body 1 mm.; width of prothorax .21 mm.; width of mesothorax .25 mm.; width of abdomen .28 mm. Length of antennal segments 15 μ, 33 μ, 46 μ, 31 μ, 24 μ, 21 μ, 16 μ, 12 μ, 15 μ.

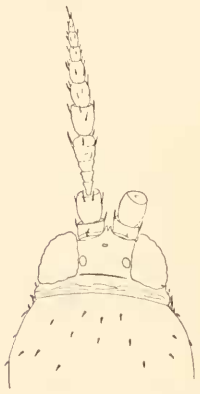

Fig. 1.—*Heterothrips salicis* n. sp.—Head, prothorax and antenna of female.

Head 2.4 times as broad as long, broadest behind. Distinct transverse stria between posterointerior corners of eyes; other striations forming a transversely elongated reticulum near posterior margin. Cheeks behind eyes bearing several short spines directed forward. Frons deeply emarginate between antennae; prominent spine beneath base of each antenna. Eyes black, with light brown margins, projecting prominently in front beside the basal segments of the antennae; spines between facets verysmall. Posterior ocelli situated well back, contiguous with borders of eyes. Mouth cone short, reaching slightly beyond middle of prosternum. Maxillary palpi 3-

segmented, last segment shortest. Antennae 3.4 times as long as exposed portion of head ; nine-segmented. Segments 1, 2 and 5-8 barrel-shaped ; third vase-shaped, with two conspicuous constrictions and several other less distinct annuli; fourth cup-shaped; *both third and fourth are without distal circle of sensoria ;* ninth cylindrical. Segments one, two, and five to nine concolorous with body ; third light yellow, palest at base ; fourth brownish, paler toward base than at tip. Sense cones and spines of only moderate size, not conspicuous. *Segments are closely united ; articulations are brown, not clear.*

Prothorax twice as long as head ; sides strongly arcuate ; set with numerous short, slightly curved spines, a group of three or four at each angle being more conspicuous than at the middle of the sides ; irregular transverse markings dorsally. Mesothorax slightly wider than metathorax ; transversely striated. Metathorax with concentric polygonal markings. Fore-wings reaching nearly to or slightly beyond tip of abdomen ; brown, paler at base ; costal margin decidedly concave, bearing about 28 stout spines which are longer toward the tip, and among which are numerous slender hairs ; fore vein with about 24, hind vein with 16 or more short spines placed nearly equidistant from each other throughout; surface of wings covered with minute spines. Legs concolorous with body, except tarsi and distal part of fore tibiae which are yellow ; not prominently spinose, but bearing numerous irregular ridges which appear almost like the coarse reticulum on the sides of the thorax and abdomen.

Abdomen widest about the fourth segment. Each segment from the second to the tenth bears dorsally two distinct spines, which are close together in front, gradually diverge to the ninth segment, but are close together on the tenth ; a number of smaller spines sometimes fall roughly into two rows along the sides, and into one row ventrally. Posterior borders of segments two to eight prolonged into numerous short spines. Tenth segment split in its median dorsal line through its distal third. Spines around tip of abdomen not very prominent.

Male.—General color sometimes much paler than that of the female. Length of body .72 mm. ; width of prothorax .18 mm. ; width of mesothorax .21 mm. ; width of abdomen .16 mm. Length of antennal segments 10 μ, 23 μ, 37 μ, 33 μ, 21 μ, 21 μ, 15 μ, 12 μ, 14 μ.

Wings are of full length, extending beyond tip of abdomen.

Tip of abdomen bluntly conical. Ventral sides of abdominal segments three to eight with an oblong pale area transversely placed.

Described from numerous females and four males taken July 14, 1908, on the outside of the catkins of the willow, *Salix fluviatilis.* The italicized characters distinguish this species from its congener *H. arisaemae* Hood.

SCIRTOTHRIPS n. gen. (Figs. 2–4).

(σκιρτάω, to leap; θρίψ, a wood-worm.)

Ocelli present. *Head is shorter than broad and shorter than prothorax.* Antennae eight-segmented. Maxillary palpi three-segmented. Legs bearing only medium to weak spines. Wings present, with rugose veins bearing weak spines. *One spine of moderate length is borne by each posterior angle of the prothorax.* None of the body spines stout.

Species of this genus have the power of springing.

This genus reminds one at once of the genus *Anaphothrips* Uzel, but can be at once distinguished from that genus by the above italicized characters. It can be further distinguished from our member of that genus, *A. striatus* (Osborn), by the fact that the sixth antennal segment is not divided by an oblique groove. By proposing the name *Scirtothrips*, I do not wish to imply that the leaping of this insect is remarkable for its vigor; on the contrary, its leap is weaker than that of many other springing species. I do wish, however, to emphasize the fact that it does spring, for it is this character, I believe, which most surely marks the new species as belonging to a genus distinct from *Anaphothrips*. It might be fairly doubted whether two insects so similar in general form and in type of wing should be placed in separate genera merely because the original description of the one genus precluded a short head and a given spine on the prothorax; but when these structural differences are accompanied by a difference of habit, there is good reason for the erection of a new genus, particularly since the habits of thrips, at least in the matter of springing, are more constant than many of the structural characters commonly used to distinguish species.

Scirtothrips ruthveni n. sp. (Figs. 2–4).

Female.—General color of body lemon-yellow, without any shading. Length of body .85 mm.; width of prothorax .15 mm.; width of mesothorax .21 mm.; width of abdomen .21 mm. Length of antennal segments 15 μ, 36 μ, 41 μ, 36 μ, 33 μ, 39 μ, 6 μ, 10 μ.

Head 1.8 times as broad as long. Frons emarginate between antennae. Spines few and weak, those most readily visible being one at each side of the head just behind the eye; others apparently not constant. Eyes black, slightly protruding, sparsely pilose. Ocelli clustered, with red-

dish orange crescents. Mouth cone reaching nearly to posterior edge of prothorax, moderately sharp. Maxillary palpi three-segmented. Antennae eight-segmented, 2.8 times as long as exposed part of head. First segment cylindrical, second barrel-shaped; third and fourth more or less fusiform; fifth and sixth subcylindrical; seventh cylindrical; eighth conical. Third segment distinctly, fourth and fifth slightly, stalked. Bifurcate sense cones on dorsal side of third segment and ventral side of fourth. Spines on antennae distinct, but not prominent. Color uniform yellow.

Fig. 2.—*Scirtothrips ruthveni* n. gen. and n. sp.—Head, prothorax and antenna of female.

Prothorax 1.8 times as long, and 1.2 times as wide, as head. Sides considerably arched. Two or three short, curved spines near each anterior angle, one long but weak spine at each posterior angle. Other spines wanting or inconspicuous. Mesothorax with rounded anterior angles. Wings concolorous with body; costal and both interior veins promi-

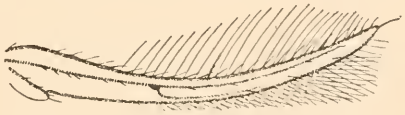

Fig. 3.—*Scirtothrips ruthveni* n. gen. and n. sp.—Right fore-wing of female.

nent, and rugose, at least in basal part; costa set with about 23 spines, which increase in length to the tip; fore vein with 10 or 11 spines whice are closely set but at unequal distances in the basal half, far apart distally; hind vein with three spines not constantly placed. Entire surface of wing, including veins, covered with minute spines arranged in longitudinal rows which, in the basal half of the wing, are ten to twelve in number. Legs not stout, concolorous with body.

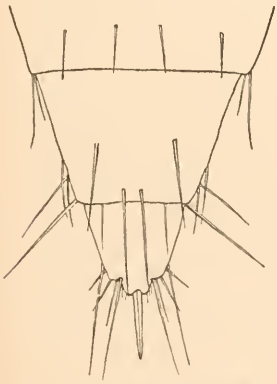

Fig. 4.—*Scirtothrips ruthveni* n. gen. and n. sp.—Tip of abdomen of female, dorsal view.

Abdomen widest about fourth or fifth segment, uniform in color. Ninth segment nearly twice as long as tenth. Spines inconspicuous, except those on segments nine and ten, and these are weaker than frequently found among Thripidae. Ovipositor long, extending considerably beyond tip of abdomen.

Described from seven females taken in the terminal leaf clusters of dogwood, *Cornus stolonifera*, on

July 19, 1908. I take pleasure in naming this species for Dr. A. G. Ruthven, Chief Field Naturalist of the Michigan Biological Survey, in recognition of his aid and kindly interest in all my work.

Genus **ANAPHOTHRIPS** Uzel.

Anaphothrips striatus (Osborn).

Male.—Newly discovered.* Agrees well with the female, except that it is smaller, and the abdomen is more slender and bluntly rounded at the tip. Length of body .83 mm.; width of prothorax .14 mm.; width of prothorax .14 mm.; width of mesothorax .16 mm.; width of abdomen .16 mm. All tarsi, as in female, unarmed.

Two specimens taken with numerous females on sand-binder, *Ammophila arenaria*, July 7, 1908. This species has long been supposed to be parthenogenetic in nature, and was bred parthenogenetically for several generations by Hinds. It may be doubted whether these sporadic males are ever functional.

Genus **BALIOTHRIPS** Haliday.

Baliothrips basalis n. sp. (Fig. 5).

Female.—General color of body brown, appearing to the unaided eye, by reflected light, nearly black, with a transverse white band across the pterothorax. Length of body 1.12 mm.; width of prothorax .20 mm.; width of mesothorax .26 mm.; width of abdomen .26 mm. Length of antennal segments 15 μ, 36 μ, 43 μ, 40 μ, 39 μ, 47 μ, 21 μ.

Head slightly broader than long, cheeks slightly diverging behind the eyes; posterior portion transversely striated. Frons sharply emarginate between antennae. One short postocular spine well toward each side of the head; four, sometimes three, other spines in a transverse row on each side nearer the median line, the innermost one being longest and standing directly behind the ocellus of that side. A spine on either side of the anterior ocellus, nearly between it and the two posterior ocelli, and a longer spine near inner margin of each eye in front. Eyes rather prominent, black, with yellow margins. Ocelli reddish orange, rather close together, posterior ones not contiguous with eyes. Mouth cone reaching slightly past middle of prothorax; maxillary palpi two-segmented. Antennae seven-segmented, 2.2 times as long as head. First segment cylindrical; second barrel-shaped; third to fifth vase-like; sixth broadest near base; seventh slightly tapering.

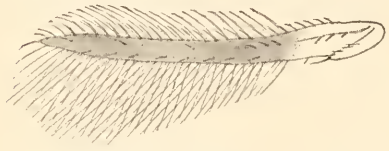

Fig. 5.—*Baliothrips basalis* n. sp.—Left fore-wing of female.

* I have found but one reference to a supposed male of *Anaphothrips striatus*, namely that of L. R. Cary, Bull. 83, Maine Agr. Exp. Station, June, 1902. Cary's figures plainly show that his male was not of this species.

First and second and fifth to seventh segments concolorous with body; third yellow; fourth brownish yellow. Bifurcate sense cone near tip of fourth segment on ventral side is especially noticeable.

Prothorax 1.25 times as long and 1.3 times as wide as head. Two prominent spines at each posterior angle; two much shorter, curved, anteriorly directed ones near each anterior angle; and several other short, curved ones along the sides. Mesothorax with irregular transverse striations. Metathorax with sigmoid longitudinal markings which branch and anastomose. *Pterothorax is not distinctly lighter in color than the rest of the body.* Fore-wings reaching about to tip of abdomen; brown like the body, except a broad area at the base which is white, forming in the uncleared insect a conspicuous transverse white band; third quarter of wing often *slightly* paler than second and fourth quarters; *there is no light fleck near the tip of the wing.* Costal margin set with about thirty rather stout spines which increase in length toward the tip; fore vein with eight to ten weak spines, of which five or six are on the basal two-fifths, the remaining three or four widely separated; hind vein with seven to nine spines on distal two-thirds of wing, slightly farther apart near tip of wing. Surface of wings covered with minute spines arranged in about twenty-one rows. Legs concolorous with body, except tarsi and distal portions of all tibiae, and sometimes proximal end of femora yellow; a row of short stout spines on inner side of hind tibiae, other spines irregularly placed.

Abdomen with long spines on last two segments; shorter spines along the sides; spines on ventral side weak and arranged roughly in a transverse row on each segment; those on dorsal side inconspicuous and irregularly arranged. Tenth segment split above for at least part of its length, sometimes wholly.

Male.—Length of body .87 mm.; width of prothorax .17 mm.; width of mesothorax .23 mm.; width of abdomen .17 mm. Length of antennal segments 15 μ, 30 μ, 38 μ, 39 μ, 33 μ, 46 μ, 21 μ.

Wings are present, with pale area on third quarter distinct, but not as conspicuous as on basal quarter. Legs with bases of femora and most of tibiae yellow, fore femur lightest of the three.

Abdomen bluntly conical. Oblong pale area on ventral side of each of abdominal segments three to seven.

Described from numerous females and four males taken on upper and under sides of leaves of tall millet grass, *Milium effusum*, August 6 to 13, 1908. The italicized characters distinguish this species from *B. dispar* Haliday. I have been compelled to disregard Haliday's inclusion of rudimentary wings in the males as a generic character. His wingless males, moreover, may belong to definite seasons only, as seems often to be the case with other species.

Suborder TUBULIFERA Haliday.

Family PHLOEOTHRIPIDAE Uzel.

Genus **TRICHOTHRIPS** Uzel.

Trichothrips tridentatus n. sp. (Fig. 6).

Female.—General color of body brown or light brown; much red hypodermal pigmentation; except on head and legs. Length of body 1.7 mm.; width of prothorax .24 mm; width of mesothorax .31 mm.; width of abdomen .38 mm.; length of antennal segments 16 μ, 47 μ, 56 μ, 52 μ, 52 μ, 48 μ, 37 μ, 26 μ.

Head about as broad as long. Cheeks nearly parallel, slightly rough, with several minute spines. Distinct postocular spines on each side. Eyes small, continuous in outline with cheeks and vertex; deep red with yellow margins. Ocelli present, obscured by hypodermal pigmentation.

Fig. 6.—*Trichothrips tridentatus* n. sp.—Antenna beyond second segment, and fore tarsus of female.

Mouth cone long and pointed, extending slightly beyond posterior edge of prosternum; maxillary palpi two-segmented, second segment four or five times as long as first; labial palpi with four spines at tip. Antennae twice as long as head. First segment cylindrical; second barrel-shaped, slightly narrower at base; third to sixth urn-shaped, distinctly stalked; seventh slightly stalked, forming broadly with the eighth, which is roundly conical. Segments all concolorous with body, except second and the base and top of the third, which are yellowish; the second may be clouded basally. A row of six spines on eighth segment continuous with three more on distal part of seventh. One or two simple sense cones on the third to the seventh segments inclusive.

Prothorax about as long, and (exclusive of fore coxae) 1.5 times as wide, as head. Sides strongly divergent in front half; nearly parallel, slightly concave, in posterior half. One spine at each posterior angle. Meso- and metathorax of nearly equal width. Wings present, reaching to sixth or seventh segment of abdomen; sides of fore-wing parallel, strong fringe all around, double for about ten hairs just short of tip on posterior margin; colorless throughout. Legs without hypodermal pigmentation, otherwise concolorous with body, except that the tarsi are light brown, and the tips of all femora are yellow beneath; fore femora slightly enlarged; all tarsi with a small curved tooth; fore coxae with one prominent spine.

Abdomen with sides nearly parallel to seventh segment, thence rounding off to base of tube. Spines distinct but not conspicuous. Tube slender as compared with abdomen; length .14 mm.; breadth of middle .05 mm.

Described from two females taken under the scales of the bark of white oak, *Quercus alba*, August 25, 1908. Readily distinguished from *T. dens* Moulton by the absence of hypodermal pigmentation in head and legs.

Trichothrips brevicruralis n. sp. (Fig. 7).

Female.—General color of body black, nearly opaque even with strong light. Length of body 1.71 mm. ; width of prothorax .30 mm. ; width of mesothorax .36 mm. ; width of abdomen .50 mm. Length of antennal segments 41 μ, 52 μ, 48 μ, 49 μ, 46 μ, 41 μ, 41 μ, 37 μ.

Head very slightly longer than broad ; cheeks somewhat arched behind eyes, rough, some of the prominences bearing anteriorly directed spines; surface reticulate, the cells of the reticulum having their long axis transversely placed (visible only in cleared specimens, as are many of the characters mentioned below). Frons roundly emarginate between antennae. Postocular bristles rather prominent, situated over one-third the length of the cheek behind the eyes. Eyes black, with yellowish brown margins. Ocelli present ; posterior ones almost contiguous with eyes, and located at about the middle of the latter anteroposteriorly, with a small spine behind each ; anterior one almost completely obscured by pigment. Mouth cone blunt and short, reaching but slightly past middle of prosternum ; maxillary palpi two-segmented, the second segment four or five times as long as the first. Antennae 8-segmented, 1.6 times as long as head. First segment cylindrical, second barrel-shaped, third to seventh vase-shaped, distinctly but not narrowly stalked ; eighth more or less fusiform, with its widest point two-fifths of its length from the base. First segment black ; second becoming brown toward tip ; third yellowish brown, fourth and fifth becoming gradually darker ; sixth to eighth dark brown, except base of the sixth which is paler. The second segment has a circular pale spot above near its tip ; the fourth bears on each side distally a short but quite stout simple sense cone ; the sense cones on the fifth are less conspicuous ; the eighth bears on its dorsal side a row of six spines (exclusive of the apical one) which with three similar spines on the distal third of the seventh segment form a sort of comb.

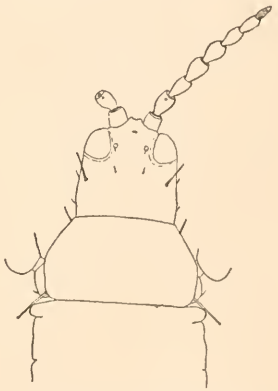

Fig. 7.—*Trichothrips brevicruralis* n. sp.—Head, prothorax, antenna and part of pterothorax.

Prothorax .83 times as long and 1.5 times as broad as head. One moderately long spine at each posterior angle, a short one at each anterior angle ; all blunt, those at the posterior angles being, like most of

those on the abdomen, slightly enlarged at the tip. Mesothorax with rather prominent anterior angles, which are nearly right-angled. Wings wanting. Legs short, dark brown to black, except the tarsi which are brown; all tarsi armed with fairly prominent curved teeth. Spines on legs short and comparatively few in number, being most numerous on convex sides of femora.

Abdomen stout, broadly rounding from seventh segment to the tube. The third to eighth segments inclusive bear five or six spines on each side, forming a row extending well on to both dorsal and ventral surfaces. Nearly all abdominal spines enlarged at tip, except on the tube and some on the ninth segment. Color black, except tip of tube which is brown.

Described from five females taken among the leaves of the pine-cone gall on the willow, *Salix fluviatilis*, July 14, 1908. The salient features of this species, one or another of which readily distinguishes it from the majority of the other members of the genus, are the absence of wings, the color of the antennae, the paucity of conspicuous spines on the prothorax, and the fact that all the tarsi are armed.

Genus **ALLOTHRIPS** Hood (1908).

Allothrips megacephalus Hood.

Male.—Newly discovered. Agrees well with the female, except in size, shape of abdomen, and in the fact that the fore tarsi are armed with a small curved tooth. Length of body .81 mm.; width of prothorax .21 mm.; width of mesothorax .21 mm.; width of abdomen .25 mm. Abdomen tapering gradually from third or fourth segment to the tube, not broadly rounded as in the female.

A single specimen taken with three females under the scales of bark of black ash, *Fraxinus nigra*, August 24, 1908. Both antennae lost beyond second segment. The definition of the genus will have to be emended by omitting the character "fore tarsi unarmed."

On Thysanoptera.

By H. J. Franklin, Ph.D.

Of the Minnesota Agricultural Experiment Station, St. Anthony Park, Minn.

ALEURODOTHRIPS n. gen.

This name "White fly thrips" has reference to the fact that the type species is predaceous on the white flies of orange trees in Florida.

Head about as long as broad, with parallel cheeks; eyes